CLAIMS

1. A heat-treatment apparatus, comprising a supporting means for supporting a workpiece turnably around a turning axis, and
a fixed induction-heating coil for induction-heating a belt zone, extending parallel to the turning axis, of the workpiece supported by the supporting means.

2. A heat-treatment apparatus, comprising a supporting means for supporting a workpiece turnably around a turning axis, and
an induction-heating coil opposed to a belt zone, extending parallel to the turning axis, of the workpiece supported by the supporting means.

3. A heat-treatment apparatus, comprising a supporting means for supporting a columnar workpiece to be turnable in a periphery direction around a turning axis extending in a length direction, and
an induction-heating coil opposed to a belt zone, extending parallel to the turning axis, of a peripheral face of the workpiece supported by the supporting means.

4. A heat-treatment apparatus, comprising a rod-shaped supporting means for supporting a tubular workpiece, inserted into a hollow of the workpiece, to be turnable in a periphery direction around a turning axis extending in a

length direction, and
an induction-heating coil opposed to a belt zone of a peripheral face of the workpiece and extending parallel to the turning axis of the workpiece supported by the supporting means.

5. The heat treatment apparatus according to any of claims 1 to 4, wherein the supporting means supports a workpiece which is ferromagnetic at a temperature below the magnetic transformation point thereof and becomes paramagnetic at a temperature above the magnetic transformation point.

6. The heat treatment apparatus according to any of claims 1 to 5, wherein the supporting means is movable from a position for supporting the workpiece to another position to release the workpiece to fall, and is provided with a cooling tank containing a coolant below the workpiece supported by the supporting means.

7. The heat treatment apparatus according to any of claims 1 to 6, wherein the induction-heating coil is constituted of a pair of partial coils placed in opposition on both sides of the workpiece.

8. The heat treatment apparatus according to any of claims 1 to 7, wherein the induction-heating coil is in a rectangle shape, and

the supporting means is placed between a pair of long sides of the rectangle-shaped induction-heating coil, and supports the workpiece extending parallel to the pair of the long sides.

9. A heat-treatment apparatus, comprising
a ceramic supporting rod inserted in a hollow of a helix member for supporting the helix member formed from a wire material which is transformed from ferromagnetic to paramagnetic by temperature elevation above the magnetic transformation point, to be turnable in the periphery direction of the helix member, and
an induction-heating coil placed to face counterposed portions, on both sides of the supporting rod, of the peripheral face of the helix member supported by the supporting rod.

10. The heat treatment apparatus according to claims 9, wherein the induction-heating coil is constituted of a pair of partial coils placed in opposition on both sides of the helix member.

11. The heat treatment apparatus according to claim 10, wherein the pair of the partial coils extend along the peripheral face of the helix member in the length direction thereof, and
the supporting rod is placed between the pair of the partial coils, and extends parallel to the pair of the

partial coils.

12. The heat treatment apparatus according to any of claims 9, 10, and 11, wherein the supporting rod is movable from a position for supporting the helix member to another position to release the helix member to fall, and is provided with a cooling tank containing a coolant below the helix member supported by the supporting rod.

13. A heat treatment method for a workpiece, comprising supporting the workpiece turnably around a turning axis, induction-heating a belt zone, extending parallel to the turning axis, of the workpiece by bringing an induction-heating coil near to the belt zone,
allowing the workpiece to turn by a magnetic force, when the belt zone has been heated above a predetermined temperature, to bring another portion other than the belt zone near to the induction coil, and
induction-heating the portion.

14. A heat treatment method for a columnar workpiece, comprising supporting the columnar workpiece turnably in a periphery direction,
induction-heating a belt zone, extending in a height direction, of the columnar workpiece by bringing an induction-heating coil near to the belt zone,
allowing the columnar workpiece to turn by a magnetic force, when the belt zone has been heated above a predetermined

temperature, to bring another portion other than the belt zone near to the induction coil, and
induction-heating the portion.

15. A heat treatment method for a tubular workpiece, comprising supporting the tubular workpiece to be turnable in a periphery direction of the tubular workpiece by a rod-shaped supporting means inserted into a hollow of the workpiece,
induction-heating a belt zone, extending parallel to the supporting means, of the peripheral face of the tubular workpiece by bringing an induction-heating coil near to the belt zone,
allowing the tubular workpiece to turn by a magnetic force, when the belt zone has been heated above a predetermined temperature to bring a portion other than the belt zone near to the induction coil, and
induction-heating the portion.

16. A heat treatment method for a helix member, comprising
supporting the helix member turnably in a direction of the periphery thereof by a ceramic supporting rod inserted into a hollow of the helix member formed from a material which is transformed from ferromagnetic to paramagnetic by temperature elevation above the magnetic transformation point,
induction-heating opposed portions of the peripheral face

of the helix member, supported by the supporting rod on the both sides of the supporting rod, by bringing an induction-heating coil near to the opposed portions,
allowing the helix member to turn by a magnetic force, when the belt zone has been heated above a predetermined temperature, to bring portions other than the opposed portions near to the induction coil, and
induction-heating the portions.

17. The heat treatment method according to claim 16, wherein the helix member is allowed to fall, when the helix member has heated up to a predetermined hardening temperature, into a cooling tank containing a coolant by pulling the supporting rod out of the hollow portion of the helix member.

18. A heat-treatment apparatus, comprising
a ceramic supporting rod inserted in a hollow of a coil spring for supporting the coil spring formed from a wire material which is transformed from ferromagnetic to paramagnetic by temperature elevation above the magnetic transformation point to be turnable in the periphery direction of the coil spring, and
an induction-heating coil placed to face counterposed portions, on both sides of the supporting rod, of the peripheral face of the coil spring supported by the supporting rod.

19. The heat treatment apparatus according to claims 18, wherein the induction-heating coil is constituted of a pair of partial coils placed in opposition on both sides of the coil spring.

20. The heat treatment apparatus according to claim 19, wherein the pair of the partial coils extend along the peripheral face of the coil spring in the length direction thereof, and
the supporting rod is placed between the pair of the partial coils, and extends parallel to the pair of the partial coils.

21. The heat treatment apparatus according to any of claims 18, 19, and 20, wherein the supporting rod is movable from a position for supporting the helix member to another position to release the helix member to fall, and is provided with a cooling tank containing a coolant below the coil spring supported by the supporting rod.

22. A heat treatment method for a coil spring, comprising supporting the coil spring turnably in a direction of the periphery thereof by a ceramic supporting rod inserted into a hollow of the coil spring formed from a material which is transformed from ferromagnetic to paramagnetic by temperature elevation above the magnetic transformation point,
induction-heating opposed portions of the peripheral face

of the coil spring, supported by the supporting rod on the both sides of the supporting rod, by bringing an induction-heating coil near to the opposed portions,
allowing the coil spring to turn by a magnetic force, when the belt zone has been heated above a predetermined temperature, to bring portions other than the opposed portions near to the induction coil, and
induction-heating the portions.

23. The heat treatment according to claim 22, wherein the coil spring is allowed to fall, when the coil spring has heated up to a predetermined hardening temperature, into a cooling tank containing a coolant by pulling the supporting rod out of the hollow portion of the coil spring.